Low Dissolved Oxygen Impairments in the Blackwater River, Tarrara Creek and Virginia Beach Area Watersheds

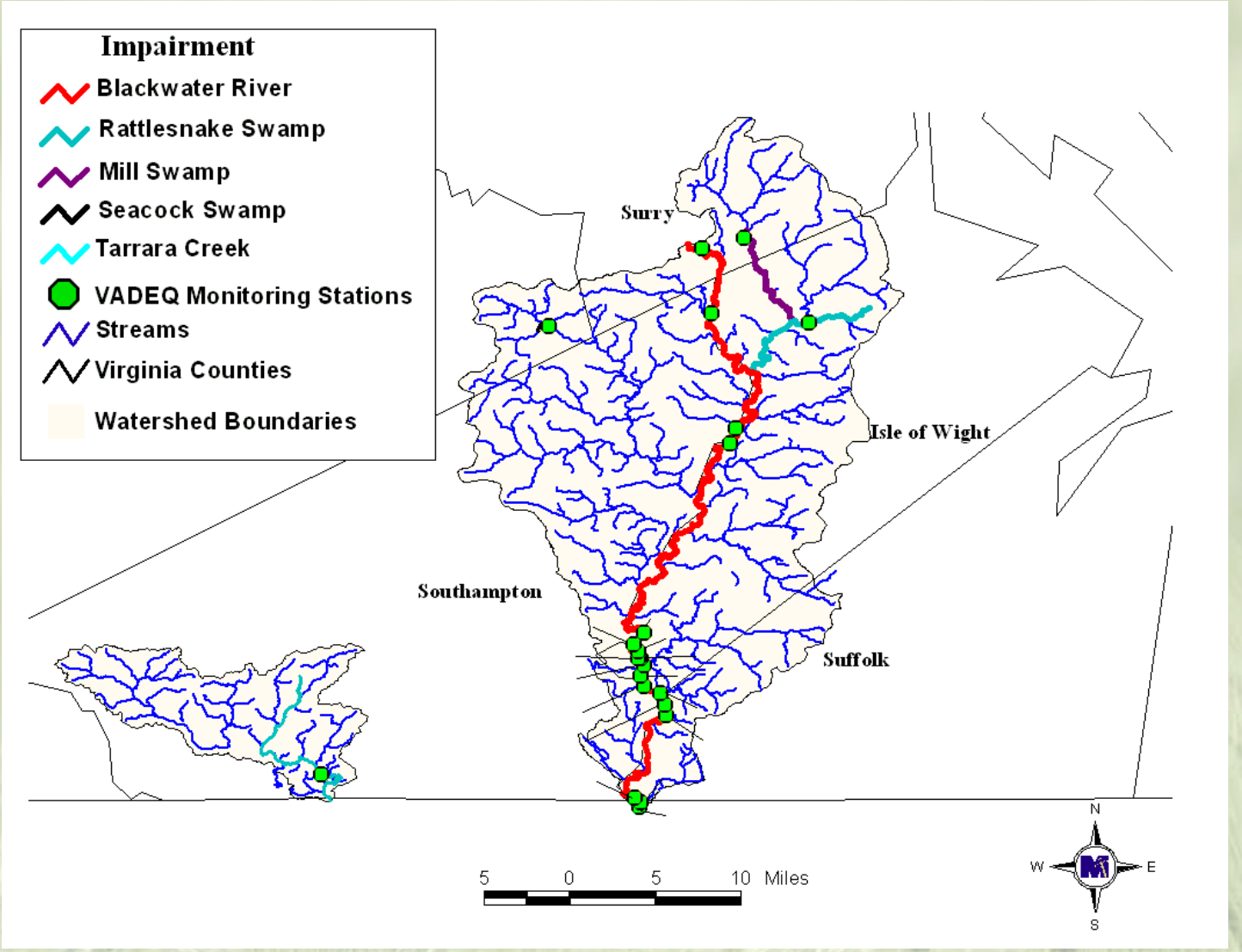
First Public Meeting

July 28, 2009

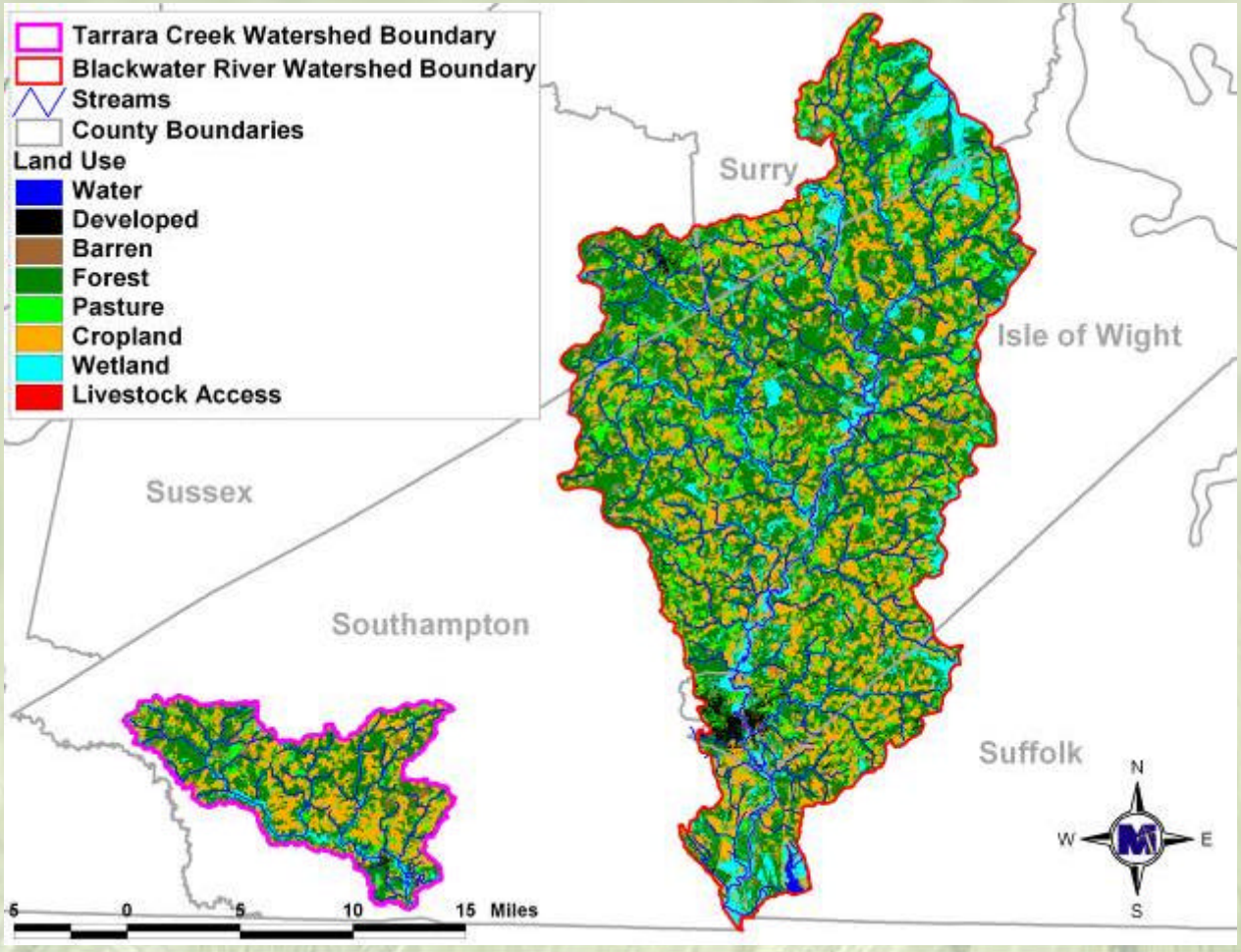
Why are we here?

- Low dissolved oxygen (DO) in:
  - Tarrara Creek
  - Blackwater River
  - Mill Swamp
  - Rattlesnake Swamp
  - Seacock Swamp
  - Albemarle Canal/ North Landing River
  - West Neck Creek
  - Milldam Creek
  - Nawney Creek

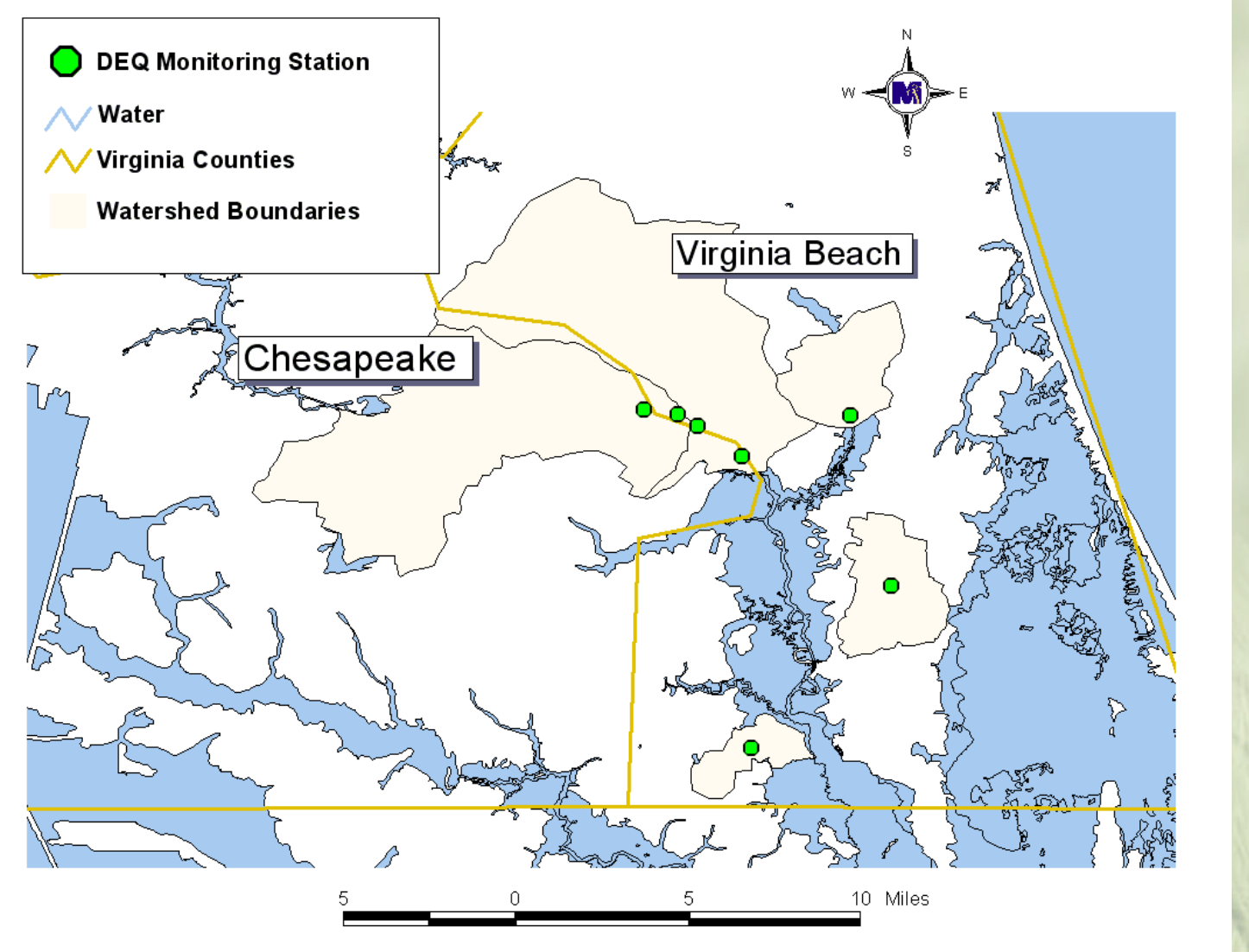
Blackwater River/ Tarrara Creek



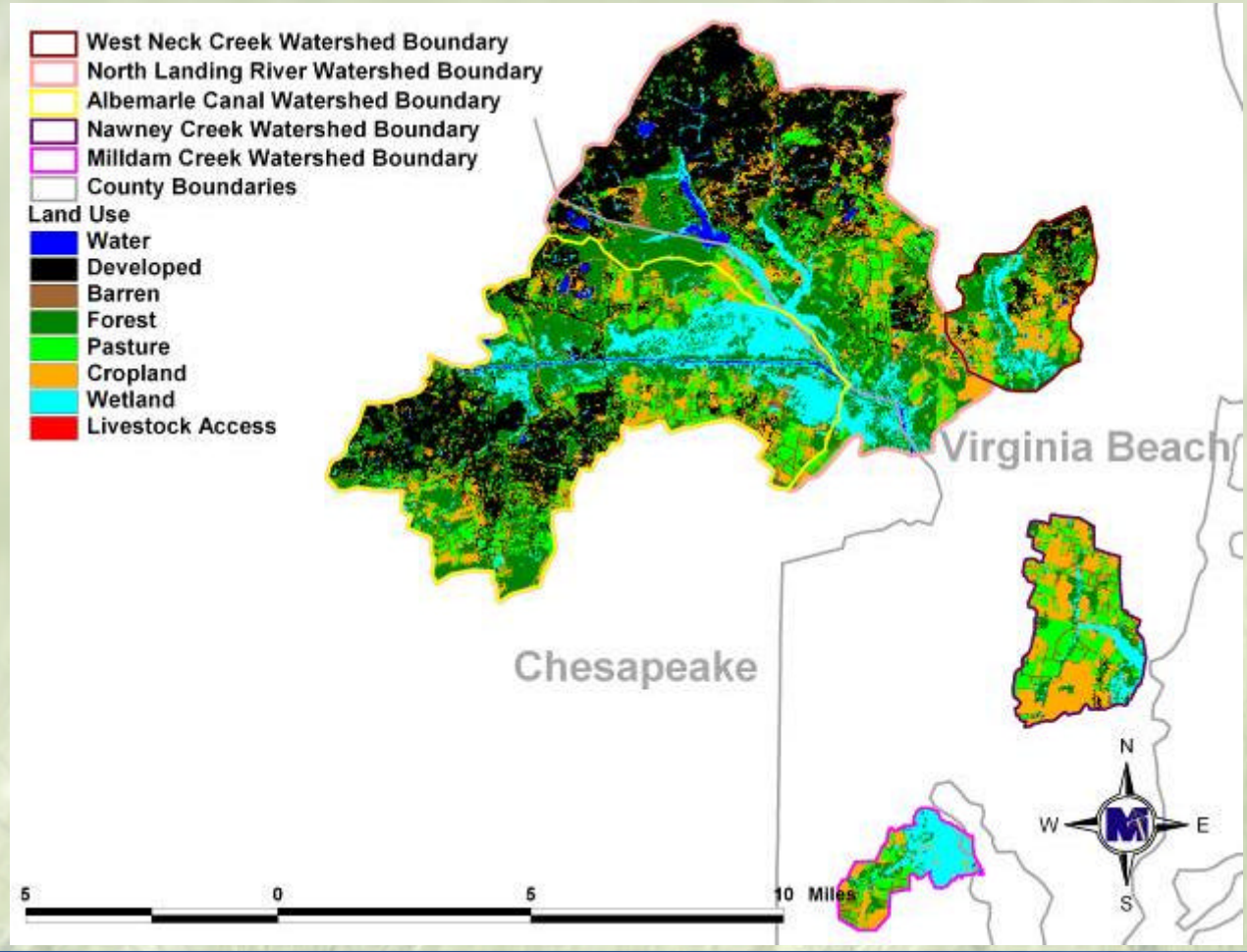
Blackwater River/Tarrara Creek Watersheds Land Use



Virginia Beach Area Watersheds

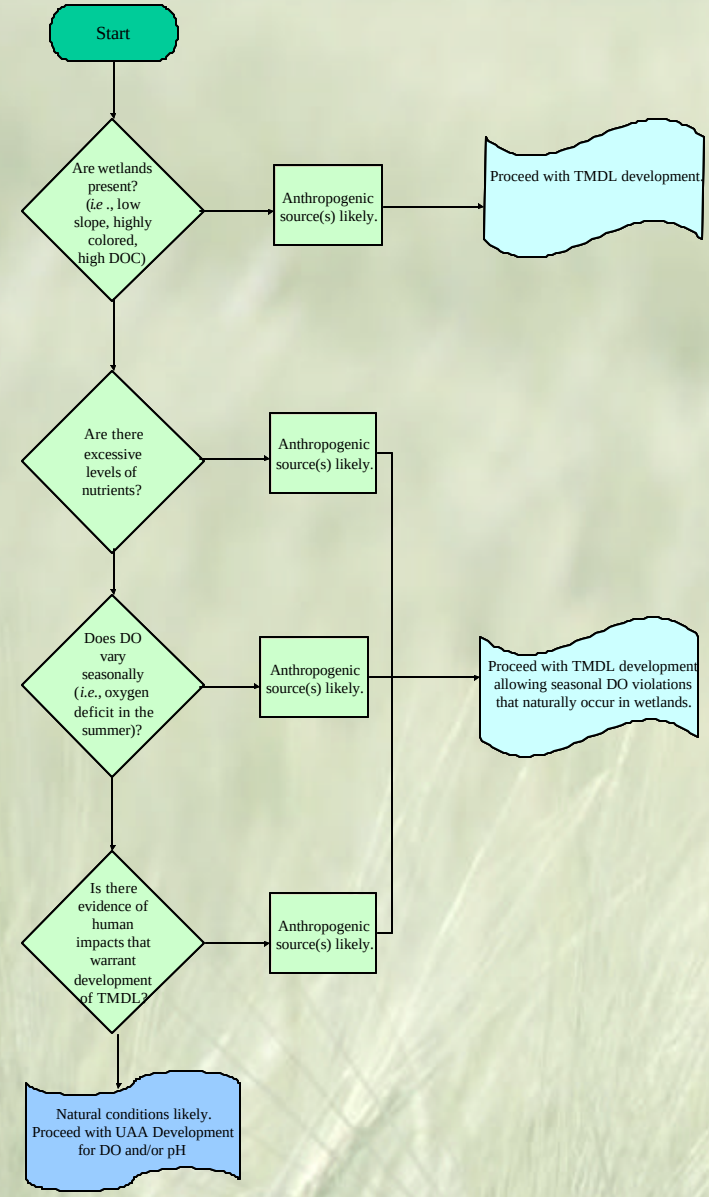


Virginia Beach Area Watersheds Land Use



Low DO in Wetland Streams as a Naturally Occurring Condition

- Streams or stream segments that have naturally low DO (< 4 ppm) drain wetlands.
- They are characterized by:
  - Very low velocity flows (flat water with low reaeration rates).
  - Large inputs of plant material that consumes oxygen as it decays.
  - Elevated Dissolved Organic Carbon (DOC) levels that colors the water.



A Decision Tree Guides the Assessment

The Decision Tree Includes Four Questions

Question 1: Are wetlands present?

Question 2: Are there excessive levels of nutrients?

Question 3: Does DO vary seasonally?

Question 4: Is there other evidence of human impacts that warrant development of a TMDL?

Question 1: Are wetlands present?

Criteria for wetland: flat water with slope < 0.1%, color > 50 units ("tea" colored), DOC >10mg/L, wetland vegetation

- Yes; go to question 2
- No; anthropogenic source likely, proceed with TMDL development

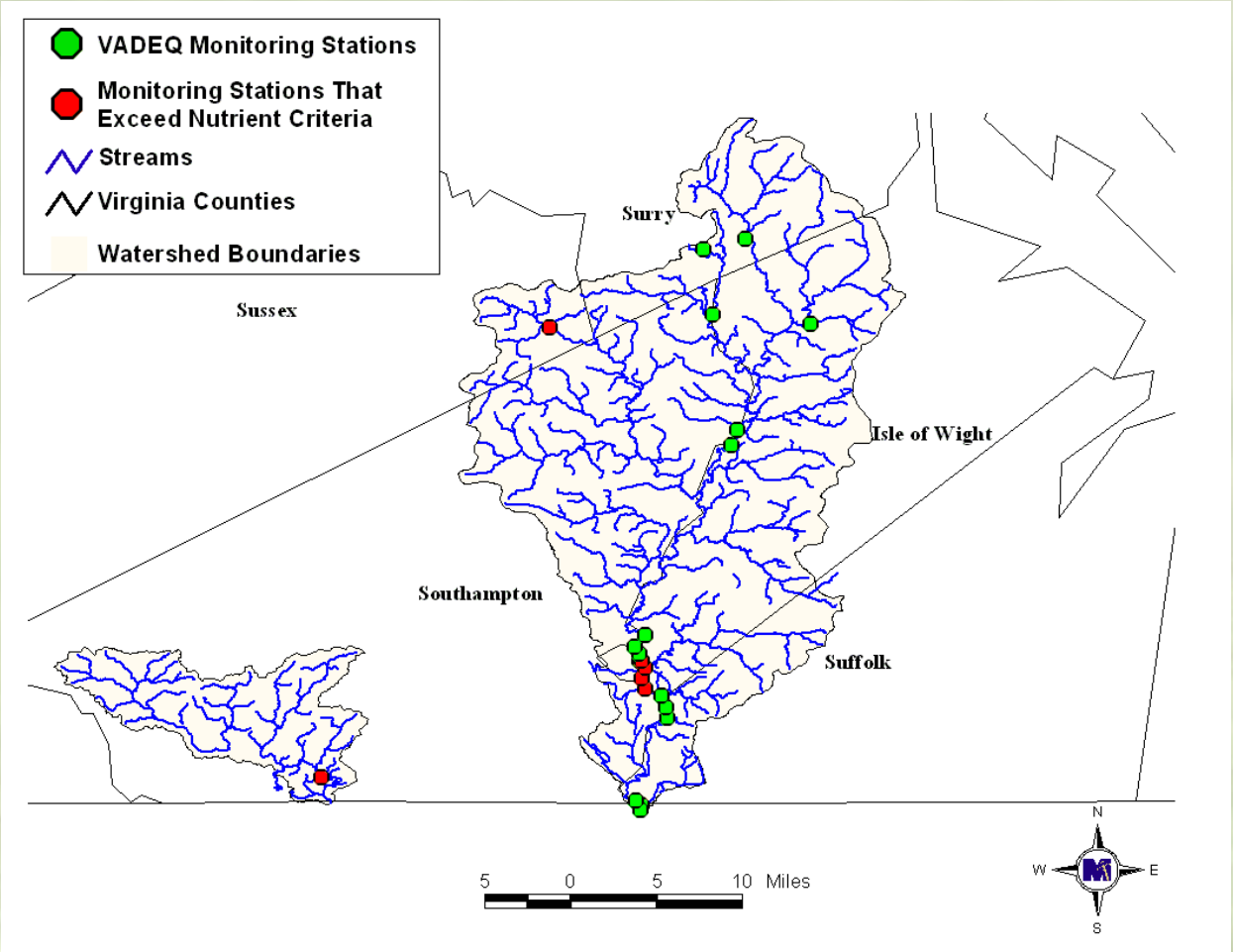
Question 2: Are there excessive nutrients in the stream?

Criteria for excessive nutrients:

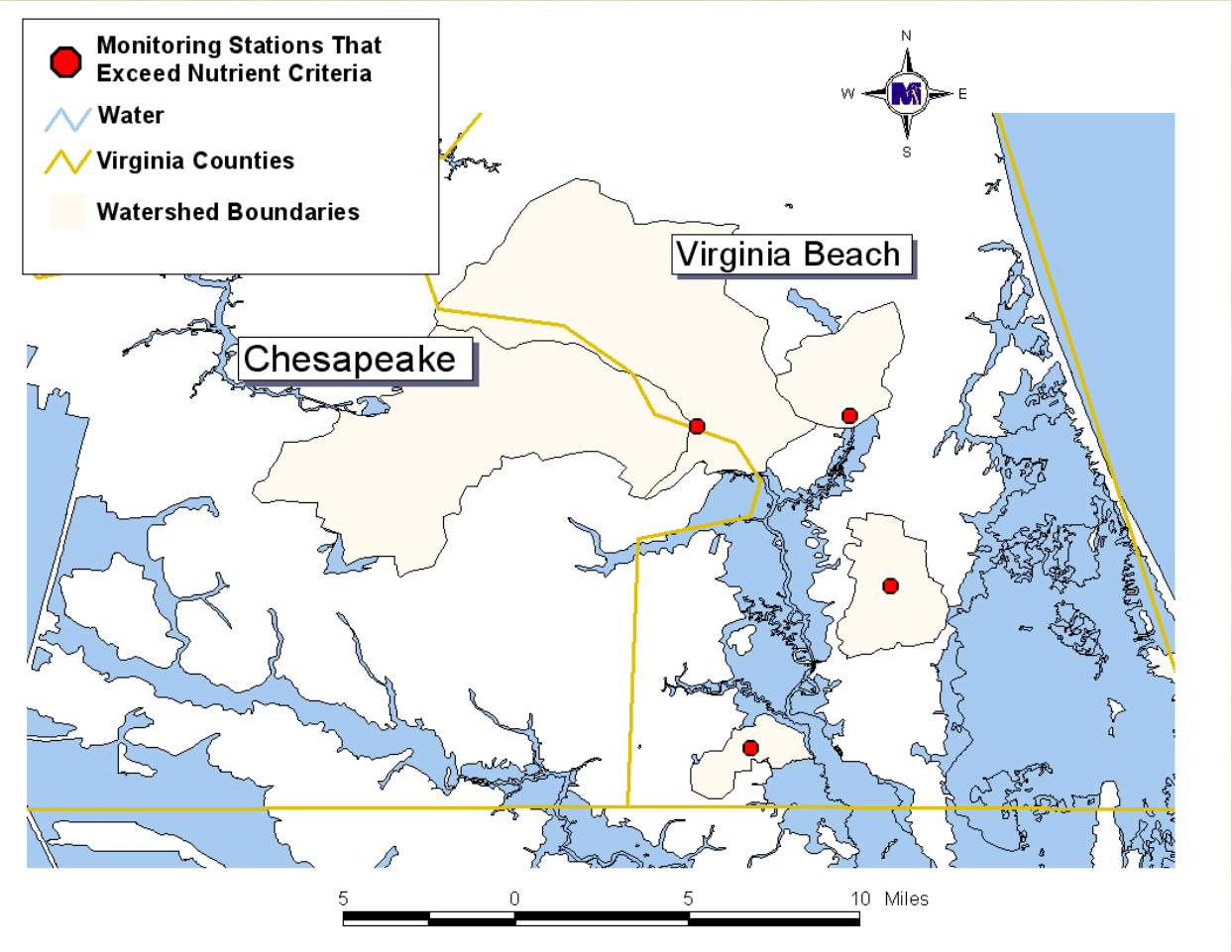
TN > 1 mg/L and/or TP > 0.1 mg/L

- Yes; anthropogenic source is likely, proceed with TMDL development
- No; go to question 3

Nutrients in the Blackwater River and Tarrara Creek Watersheds



Nutrients in the Virginia Beach Watersheds



Question 3: Does DO vary seasonally?

Rationale: Naturally low DO in wetlands is associated with low flow and high temperature. If a wetland DO does not recover in the winter months, an anthropogenic source is likely.

- Yes; go to question 4.
- No; anthropogenic source likely, proceed with TMDL development

Question 4: Is there evidence of other human impacts?

Rationale: Every effort should be made to identify and reduce human impacts that would exacerbate the naturally low DO and/or pH

- Yes; anthropogenic source likely, proceed with TMDL development
- No; low DO has a natural cause, pursue reclassification as Class IV Swamp Waters

If it's not a totally natural condition, what is the cause?

- Determine human-created cause(s) of low dissolved oxygen (DO)
  - Organic enrichment
  - Nutrients
  - Low DO inputs
    - Permitted discharges
    - Reservoirs

TMDLs Addressing Low DO

- Organic Enrichment
  - Most have fecal bacteria TMDLs associated with them that would target organic enrichment
- Nutrients
  - Use reference watershed to establish an appropriate load (more later)
- Low DO inputs
  - Impact analysis to assess reductions needed

Nutrient TMDL Approach

- Determine limiting nutrient
- Identify reference watershed with similar hydrology, but no identifiable human impacts on DO
- Set nutrient load limit based on those observed in the reference watershed

What's next?

- 30-day comment period
- Complete assessment of natural conditions
- Identify reference watershed(s) as needed
- Complete TMDLs
- Present Results at a second Public Meeting
- 30-day comment period
- Submit to EPA and State Water Control Board

Contact Information

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